UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/321,715	05/28/1999	YASUHIKO TAKEMURA	0756-1974	6930

7590 04/04/2003

ROBINSON INTELLECTUAL PROPERTY LAW OFFICE
PMB 955
21010 SOUTHBANK STREET
POTOMAC FALLS, VA 20165

EXAMINER	
WILCZEWSKI, MARY A	
ART UNIT	**PAPER NUMBER**
2822	

DATE MAILED: 04/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/321,715	Applicant(s) Takemura et al.
	Examiner Mary Wilczewski	Art Unit 2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *three* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Jan 27, 2003*.

2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1, 3-9, 11-17, 19-25, 27-33, 35-41, and 43-117* is/are pending in the application.

4a) Of the above, claim(s) ______ is/are withdrawn from consideration.

5) ☐ Claim(s) ______ is/are allowed.

6) ☒ Claim(s) *1, 3-9, 11-17, 19-25, 27-33, 35-41, and 43-117* is/are rejected.

7) ☐ Claim(s) ______ is/are objected to.

8) ☐ Claims ______ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on ______ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☒ The proposed drawing correction filed on *Apr 10, 2000* is: a) ☒ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☒ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. *08/287,259*.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). ______

4) ☐ Interview Summary (PTO-413) Paper No(s). ______

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other:

DETAILED ACTION

Priority

Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 08/287,259, filed on August 8, 1994.

Drawings

The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on April 10, 2000, have been approved.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-12, 14-16, 49-58, 60-62, 70-81, 83-85, 94, 106, 107, 112, 113, 115, and 116 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Chen et al., U.S. Patent 5,322,807, in view of Ipri, U. S. Patent 4,597,160, both of record.

Chen et al. disclose a method of fabricating a thin film transistor which comprises the steps of forming an amorphous silicon film, crystallizing the amorphous silicon film, and oxidizing the crystallized silicon film at a pressure of 5 to 10 atmospheres at a temperature less than 825 °C, see column 2, lines 54-56, column 3, lines 27-32, 42-47, and column 4, lines 13-16. Although Chen et al. disclose that growth of the TFT dielectric must be grown at a temperature less than 825 °C, Chen does not specifically teach to use temperatures in a range of 500 to 650 °C, or temperatures below the strain point of the glass substrate. Nor does Chen et al. disclose that the high pressure oxidation step is performed in an oxidizing atmosphere containing water vapor. Ipri discloses a method of fabricating a semiconductor display device which comprises the steps of: forming an amorphous silicon film having a thickness of 1000-5000 angstroms, crystallizing the amorphous silicon film and oxidizing the crystallized silicon film at a pressure of 1 atm and a temperature in the range of 580 °C to 620 °C, see column 2, lines 3-34, the Example, and column 3, lines 20-28. Given the teaching of Chen et al. that it is necessary to use processing temperatures less than 825 °C in the fabrication of thin film transistors, it would have been obvious to one skilled in the art that the oxidation temperatures of Ipri could have been used in the known method of Chen et al., since these temperatures are below 825 °C. Moreover, it would have been obvious to one skilled in the art that the oxidizing atmosphere of Ipri, as well as the

temperature range of Ipri, could have been used in the method of Chen et al., since Ipri teaches that a high quality dielectric of a TFT can be formed by the high pressure oxidation performed in steam at temperatures in the range of 580 to 620 °C.

Claims 17-24, 63-69, 86-93, 95, 108, 114, and 117 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al., U.S. Patent 5,322,807, in view of Ipri, U. S. Patent 4,597,160, further in view of Troxell et al., U. S. Patent 4,851,363, all of record.

Chen et al. and Ipri are applied as above. Chen and Ipri lack anticipation only of teaching to use an alkali-free glass substrate in the disclosed method of fabricating a thin film transistor. Troxell et al. disclose a method of fabricating polysilicon thin film transistors on inexpensive alkali-free glass substrates which require processing temperatures of less than about 800 °C. It would have been obvious to one skilled in the art that the alkali-free glass substrate of Troxell et al. could be used in the known method of Chen in view of Ipri, since the processing temperatures of Chen and Ipri are less than about 800 °C.

Claims 13, 59, 82, 98, 102, and 104 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al., U.S. Patent 5,322,807, in view of Ipri, U. S. Patent 4,597,160, as applied to claims 1, 9, 49, 56, 70, and 78 above, and further in view of Wolf et al., pages 216-217, all of record.

Chen and Ipri are applied as above. Ipri lacks anticipation only of disclosing that the steam oxidation step is a pyrogenic oxidation step. Wolf et al. disclose that high pressure steam oxidations can be performed in pyrogenic oxidation systems, see page 217. Hence, it would have been obvious to one skilled in the art that the high pressure steam oxidation step of Ipri could have been performed in a pyrogenic oxidation system, since pyrogenic oxidation systems are able to produce water at high pressures. Performance of the oxidation step of Ipri in a pyrogenic oxidation system would make the oxidation step of Ipri a pyrogenic oxidation step.

Claims 99, 103, and 105 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al., U.S. Patent 5,322,807, in view of Ipri, U. S. Patent 4,597,160, in view of Troxell et al., as applied to claims 17, 63, and 86 above, and further in view of Wolf et al., pages 216-217, all of record.

Chen, Ipri and Troxell are applied as above. Ipri lacks anticipation only of disclosing that the steam oxidation step is a pyrogenic oxidation step. Wolf et al. disclose that high pressure steam oxidations can be performed in pyrogenic oxidation systems, see page 217. Hence, it would have been obvious to one skilled in the art that the high pressure steam oxidation step of

Ipri could have been performed in a pyrogenic oxidation system, since pyrogenic oxidation systems are able to produce water at high pressures. Performance of the oxidation step of Ipri in a pyrogenic oxidation system would make the oxidation step of Ipri a pyrogenic oxidation step.

Claims 25-36, 38-40, 96, 109, and 110 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al., U.S. Patent 5,322,807, in view of Ipri, U. S. Patent 4,597,160, in view of Wolf et al., pages 171-175, all of record.

Chen et al. disclose a method of fabricating a thin film transistor which comprises the steps of forming an amorphous silicon film, crystallizing the amorphous silicon film, and oxidizing the crystallized silicon film at a pressure of 5 to 10 atmospheres at a temperature less than 825 °C, see column 2, lines 54-56, column 3, lines 27-32, 42-47, and column 4, lines 13-16. Although Chen et al. disclose that growth of the TFT dielectric must be grown at a temperature less than 825 °C, Chen does not specifically teach to use temperatures in a range of 500 to 650 °C, or temperatures below the strain point of the glass substrate. Nor does Chen et al. disclose that the high pressure oxidation step is performed in an oxidizing atmosphere containing water vapor. Ipri discloses a method of fabricating a semiconductor display device which comprises the steps of: forming an amorphous silicon film having a thickness of 1000-5000 angstroms, crystallizing the amorphous silicon film and oxidizing the crystallized silicon film at a pressure of 1 atm and a temperature in the range of 580 °C to 620 °C, see column 2, lines 3-34, the Example, and column 3, lines 20-28. Given the teaching of Chen et al. that it is necessary to use processing

temperatures less than 825 °C in the fabrication of thin film transistors, it would have been obvious to one skilled in the art that the oxidation temperatures of Ipri could have been used in the known method of Chen et al., since these temperatures are below 825 °C. Moreover, it would have been obvious to one skilled in the art that the oxidizing atmosphere of Ipri, as well as the temperature range of Ipri, could have been used in the method of Chen et al., since Ipri teaches that a high quality dielectric of a TFT can be formed by the high pressure oxidation performed in steam at temperatures in the range of 580 to 620 °C. In the method of Ipri, the oxidizing step forms gate insulating layer 23 and then gate electrodes 24 are formed on the gate insulating layer, see figures 1-4. Ipri then discloses that the remaining processing steps used in the fabrication of a TFT are conventional : deposition of silicon dioxide layer 22 by CVD adjacent the crystallized silicon film. Since this is a conventional processing step used in the fabrication of TFTs, it would have been obvious to one skilled in the art that the step of forming silicon dioxide layer 22 could have been performed in the known method of Chen et al. Ipri lacks anticipation only of depositing silicon dioxide layer 22 by plasma CVD. However, it is well known that plasma-enhanced CVD permits the deposition of silicon dioxide at low temperatures, which are necessary when using inexpensive glass substrates, has fast deposition rates and provides good step coverage, see Wolf et al., pages 171-175. Therefore it would have been obvious to one skilled in the art that the silicon dioxide layer 22 of Ipri could have been deposited by plasma CVD.

Claims 41-48, 97, and 111 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al., U.S. Patent 5,322,807, in view of Ipri, U. S. Patent 4,597,160, in view of Wolf et al., pages 171-175, further in view of Troxell et al., U. S. Patent 4,851,363, all of record.

Chen et al. disclose a method of fabricating a thin film transistor which comprises the steps of forming an amorphous silicon film, crystallizing the amorphous silicon film, and oxidizing the crystallized silicon film at a pressure of 5 to 10 atmospheres at a temperature less than 825 °C, see column 2, lines 54-56, column 3, lines 27-32, 42-47, and column 4, lines 13-16. Although Chen et al. disclose that growth of the TFT dielectric must be grown at a temperature less than 825 °C, Chen does not specifically teach to use temperatures in a range of 500 to 650 °C, or temperatures below the strain point of the glass substrate. Nor does Chen et al. disclose that the high pressure oxidation step is performed in an oxidizing atmosphere containing water vapor. Ipri discloses a method of fabricating a semiconductor display device which comprises the steps of: forming an amorphous silicon film having a thickness of 1000-5000 angstroms, crystallizing the amorphous silicon film and oxidizing the crystallized silicon film at a pressure of 1 atm and a temperature in the range of 580 °C to 620 °C, see column 2, lines 3-34, the Example, and column 3, lines 20-28. Given the teaching of Chen et al. that it is necessary to use processing temperatures less than 825 °C in the fabrication of thin film transistors, it would have been obvious to one skilled in the art that the oxidation temperatures of Ipri could have been used in the known method of Chen et al., since these temperatures are below 825 °C. Moreover, it would

have been obvious to one skilled in the art that the oxidizing atmosphere of Ipri, as well as the temperature range of Ipri, could have been used in the method of Chen et al., since Ipri teaches that a high quality dielectric of a TFT can be formed by the high pressure oxidation performed in steam at temperatures in the range of 580 to 620 °C. In the method of Ipri, the oxidizing step forms gate insulating layer 23 and then gate electrodes 24 are formed on the gate insulating layer, see figures 1-4. Ipri then discloses that the remaining processing steps used in the fabrication of a TFT are conventional : deposition of silicon dioxide layer 22 by CVD adjacent the crystallized silicon film. Since this is a conventional processing step used in the fabrication of TFTs, it would have been obvious to one skilled in the art that the step of forming silicon dioxide layer 22 could have been performed in the known method of Chen et al. Ipri lacks anticipation only of depositing silicon dioxide layer 22 by plasma CVD. However, it is well known that plasma-enhanced CVD permits the deposition of silicon dioxide at low temperatures, which are necessary when using inexpensive glass substrates, has fast deposition rates and provides good step coverage, see Wolf et al., pages 171-175. Therefore it would have been obvious to one skilled in the art that the silicon dioxide layer 22 of Ipri could have been deposited by plasma CVD.

Chen and Ipri also lack anticipation of teaching to use an alkali-free glass substrate in the disclosed method of fabricating a thin film transistor. Troxell et al. disclose a method of fabricating polysilicon thin film transistors on inexpensive alkali-free glass substrates which require processing temperatures of less than about 800 °C. It would have been obvious to one skilled in the art that the alkali-free glass substrate of Troxell et al. could be used in the known

method of Chen in view of Ipri, since the processing temperatures of both Chen and Ipri are less than about 800 °C.

Claims 100 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al., U.S. Patent 5,322,807, in view of Ipri, U. S. Patent 4,597,160, in view of Wolf et al., pages 171-175, as applied to claims 25 and 33, respectively, above, and further in view of Wolf et al., pages 216-217, all of record.

Chen, Ipri and Wolf et al. are applied as above. Ipri lacks anticipation only of disclosing that the steam oxidation step is a pyrogenic oxidation step. Wolf et al. disclose that high pressure steam oxidations can be performed in pyrogenic oxidation systems, see page 217. Hence, it would have been obvious to one skilled in the art that the high pressure steam oxidation step of Ipri could have been performed in a pyrogenic oxidation system, since pyrogenic oxidation systems are able to produce water at high pressures. Performance of the oxidation step of Ipri in a pyrogenic oxidation system would make the oxidation step of Ipri a pyrogenic oxidation step.

Claim 101 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al., U.S. Patent 5,322,807, in view of Ipri, U. S. Patent 4,597,160, in view of Wolf et al., pages 171-175, further in view of Troxell et al., as applied to claim 41 above, and further in view of Wolf et al., pages 216-217, all of record.

Chen, Ipri, Wolf et al., and Troxell are applied as above. Ipri lacks anticipation only of disclosing that the steam oxidation step is a pyrogenic oxidation step. Wolf et al. disclose that high pressure steam oxidations can be performed in pyrogenic oxidation systems, see page 217. Hence, it would have been obvious to one skilled in the art that the high pressure steam oxidation step of Ipri could have been performed in a pyrogenic oxidation system, since pyrogenic oxidation systems are able to produce water at high pressures. Performance of the oxidation step of Ipri in a pyrogenic oxidation system would make the oxidation step of Ipri a pyrogenic oxidation step.

Double Patenting

Claims 1-105 of this application conflict with claims 1, 2, 12, 13, 17, and 18 of Application No. 09/222,185. 37 CFR 1.78(b) provides that when two or more applications filed by the same applicant contain conflicting claims, elimination of such claims from all but one application may be required in the absence of good and sufficient reason for their retention during pendency in more than one application. Applicant is required to either cancel the conflicting claims from all but one application or maintain a clear line of demarcation between the applications. See MPEP § 822.

Claims 1-105 of this application conflict with claims 1 and 6 of Application No. 09/615,078. 37 CFR 1.78(b) provides that when two or more applications filed by the same applicant contain conflicting claims, elimination of such claims from all but one application may be required in the absence of good and sufficient reason for their retention during pendency in more than one application. Applicant is required to either cancel the conflicting claims from all but one application or maintain a clear line of demarcation between the applications. See MPEP § 822.

Claims 1-105 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-26 of copending Application No. 09/222,185 in view of Fonash, U. S. Patent 5,275,851, of record. The claims of the present application are generic to those presented in application Serial No. 09/222, 185 in that both sets of claims require the oxidation of a crystallized semiconductor film at high pressures. The claims of application Serial No. 09/222,185 further require the use of a crystallization-promoting catalyst. However, it is well known to use a crystallization-promoting catalyst in the crystallization of amorphous silicon films, as evidenced by Fonash et al.

This is a provisional obviousness-type double patenting rejection.

Claims 1-105 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-44 of copending Application No. 09/615,078 in view of Fonash et al., U. S. Patent 5,275,851, of record. The claims of the present application are generic to those presented in application Serial No. 09/615,078 in that both sets of claims require the oxidation of a crystallized semiconductor

film at high pressures. The claims of application Serial No. 09/615,078 further require the use of a crystallization-promoting catalyst. However, it is well known to use a crystallization-promoting catalyst in the crystallization of amorphous silicon films, as evidenced by Fonash et al.

This is a provisional obviousness-type double patenting rejection.

Response to Arguments

Applicant's arguments filed January 27, 2003, have been fully considered but they are not persuasive. Applicants have argued that one of ordinary skill in the art would not have been motivated to use the oxidation temperatures of Ipri in the method of Chen, since the oxidizing ambient of Ipri is different from that of Chen. Both Ipri and Chen disclose methods of oxidizing a crystallized silicon film. Chen clearly teaches that the oxidation must be performed at temperatures less than 825 °C. Chen's temperature range of less than 825 °C clearly encompasses Applicant's claimed range of 500 to 650 °C. It has been held that in the case where the claimed ranges overlap or lie inside ranges disclosed by the prior art a prima facie case of obviousness exists. Moreover, there are three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art. *In re Rouffet* 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998). The test for obviousness is what the combined teachings of the references would have suggested to one of ordinary skill in the art, all teachings in the prior art must be considered to the extent that they are in analogous arts. Since both Chen and Ipri are drawn to methods of fabricating thin film transistor and since both Chen and Ipri disclose the formation of an insulating film on the crystallized silicon film by a high-pressure oxidation, one of ordinary skill in the art would be motivated to use the temperature range disclosed by Ipri in the known method of Chen, especially in light of the fact that Chen teaches to use oxidation temperatures of less than 825 °C and the temperature range of Ipri is less than 825 °C. Hence, it would have been obvious to one skilled in

the art that the temperature range of Ipri could have been used in the known method of Chen. Since Ipri disclose that a crystallized silicon film can be oxidized at these temperatures at I atm pressure there is a reasonable expectation of success if the temperature range of Ipri was used in the known method of Chen. Using similar reasoning, it would have been obvious to the skilled artisan that the oxidizing step of Chen could have been performed in a steam ambient, since Ipri teaches the oxidation of a crystallized silicon film in a steam abient at high pressures. Since the prior art clearly suggests the desirability of oxidizing a silicon film in steam at low temperatures (Ipri teaches that this maintains a smooth surface), it would have been obvious to one skilled in the art to combine the teachings of Chen and Ipri.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however,

will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. Wilczewski whose telephone number is (703) 308-2771.

M. Wilczewski
Primary Examiner
Tech Center 2800

MW
April 3, 2003